



TECHNICAL BULLETIN

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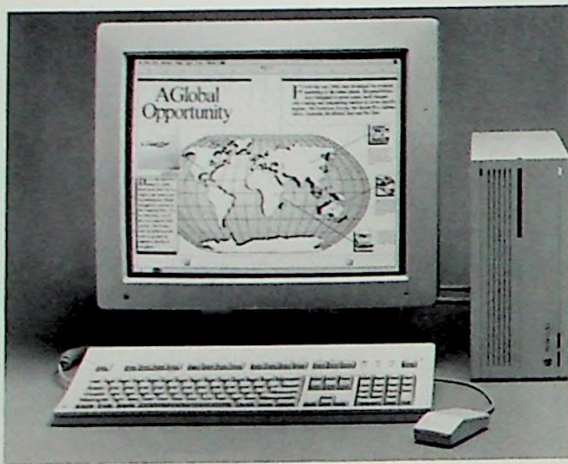
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Macintosh IICX Overview

The Apple® Macintosh® IICX computer is the newest addition to the modular Macintosh family. The Macintosh IICX has a full 32-bit Motorola 68030 microprocessor, a 68882 floating-point coprocessor, and three NuBus™ expansion slots. It also features a modular design with a small footprint, allowing the Macintosh IICX to fit



conveniently beneath a full-page display, stand beside it, or (with a third-party desk mount) be tucked under a desk and out of sight. The Macintosh IICX has been designed for easy manufacturing, servicing, and upgrading. RAM chips are mounted on SIMM sockets, and the sockets are located such that they can be changed without removing the

drive assembly or other components.

68030 and 68882

The Macintosh IICX computer features a 32-bit 68030 microprocessor, which provides fast program execution and offers a 15 percent to 20 percent performance improvement over the 68020 processor used in the original Macintosh II computer. The built-in Paged Memory Management Unit (PMMU) supports multitasking operating systems such as A/UX®, Apple's implementation of AT&T's UNIX® operating system. (In the early Macintosh IICX systems, the PMMU contained in the microprocessor is accessible only under A/UX. Later releases of Macintosh system software will allow users to take

advantage of the PMMU within the native Macintosh environment.) A 256-byte data cache provides a high-speed memory area, and a 256-byte instruction cache allows fast access to processor instructions.

The 68882 math coprocessor offers a full implementation of the IEEE Standard for Binary Floating-Point Arithmetic. This coprocessor frees the main processor from having to do the floating-point computations that are common in arithmetic-intensive applications such as spreadsheets and statistics packages.

FDHD Floppy Disk Drive

The Macintosh IICX uses the Apple FDHD™ Internal Drive, a high-density floppy disk drive with 1.4-megabyte capacity. In addition to providing 75 percent more storage capacity than 800K drives, the Apple FDHD lets you use the Apple File Exchange utility (included with the latest version of the Macintosh system software) to read directly from and write directly to MS-DOS, OS/2, and ProDOS® (Apple II) disks. A built-in 40-megabyte or 80-megabyte hard disk is also available.

Built-in Ports and Expansion Slots

Seven built-in ports allow you to expand your system with popular peripherals. A DB-19 connector is provided for the addition of an external floppy disk drive (800K or 1.4-megabyte FDHD). The Macintosh IICX also includes one 25-pin SCSI interface; two RS-422 serial ports for connection of the AppleTalk® network devices, a modem, and/or a printer; one miniature jack for stereo audio output; and two Apple Desktop

Bus™ connectors for daisy-chaining of the keyboard, mouse, and other input devices.

Three NuBus expansion slots allow you to add various Apple and third-party expansion cards so you can configure the system to meet your specific needs.

New Power-on Features

The Macintosh IICX does not rely on its battery to start up the system. Instead, the power required for the startup circuitry is provided by a trickle of current drawn from the power supply once the system is plugged in. This enables the IICX to start even if the battery fails, since the battery functions only to maintain parameter RAM and the real-time clock.

The power-on circuitry and switch for the Macintosh IICX system include a special provision for file server operation: The power switch can be rotated and locked in the "on" position. The computer will automatically restart after a power interruption, without requiring the user to take any additional action.

Configurations

The Macintosh IICX is available in four configurations:

- The Macintosh IICX system (M5660) includes 1 megabyte of RAM and one 1.4-megabyte FDHD floppy disk drive.
- The Macintosh IICX Hard Disk 40 system (M5610) includes 1 megabyte of RAM, a 40-megabyte hard disk, and one 1.4-megabyte FDHD floppy disk drive.
- The Macintosh IICX Hard Disk 80 system (M5680) includes 4 megabytes of RAM, an 80-megabyte hard disk, and one 1.4-megabyte FDHD floppy disk drive.
- The Macintosh IICX A/UX system (B0097LL/A) includes 4 megabytes of RAM, an 80-megabyte hard disk formatted with the A/UX operating system, the A/UX 1.1 Accessory Kit, and one 1.4-megabyte FDHD floppy disk drive. 🍏

The Macintosh Family at a Glance



Macintosh Plus

Processor	MC68000; 32-bit internal data bus; 7.83-megahertz clock speed
Memory	1 megabyte of RAM, expandable to 4 megabytes 256K of ROM 20 bytes of parameter RAM
Disk storage	One built-in double-sided drive uses 3.5-inch floppy disks with 800K capacity
Interfaces	Two RS-232/RS-422 serial ports One SCSI port External disk drive port Mouse port Keyboard port Sound port
Screen	9-inch diagonal screen with 512-by-342-pixel bit-mapped display
Keyboard	78 keys, including numeric keypad
Sound	Four-voice sound with 8-bit digital/analog conversion using 22-kilohertz sampling rate



Macintosh SE

Processor	MC68000; 32-bit internal architecture; 7.83-megahertz clock speed
Memory	1 or 2 megabytes of RAM, expandable to 4 megabytes 256K of ROM 256 bytes of parameter RAM
Disk storage	One built-in double-sided drive uses 3.5-inch floppy disks with 800K capacity; second built-in drive is either an 800K floppy disk drive or a 20- or 40-megabyte SCSI hard disk
Interfaces	Two Apple Desktop Bus connectors for communication with keyboard, mouse, and other input devices Two RS-232/RS-422 serial ports, 230.5 kilobaud maximum; circular mini-8 connectors External disk drive interface Macintosh SE expansion slot uses 96-pin Euro-DIN connector SCSI interface; uses a 50-pin connector (internal) and a DB-25 connector (external) Sound port for external audio amplifier or headphones (standard miniature)
Screen	9-inch diagonal screen with 512-by-342-pixel bit-mapped display
Keyboard	Detachable keyboard options: Apple Keyboard with 81 keys, including numeric keypad and cursor keys; Apple Extended Keyboard with 105 keys, including 15 function keys, separate cursor pad, 10-key numeric keypad, and Apple Desktop Bus connectors
Sound	Four-voice sound with 8-bit digital/analog conversion using 22-kilohertz sampling rate



Macintosh SE/30

Processor	MC68030 32-bit internal architecture; 15.667-megahertz clock speed; built-in Paged Memory Management Unit (PMMU); 256-byte instruction and data caches
Coprocessor	MC68882 floating-point device
Memory	1 or 4 megabytes of RAM, expandable to 8 megabytes; 256K of ROM; 256 bytes of user-settable parameter memory
Disk storage	1.4-megabyte high-density floppy disk drive (FDHD); optional internal 40- or 80-megabyte Apple SCSI hard disk; external SCSI hard disks optional
Interfaces	Two Apple Desktop Bus connectors for communication with keyboard, mouse, and other input devices 030 Direct Slot supporting full 32-bit address and data lines through 120-pin Euro-DIN connector Two RS-232/RS-422 serial ports SCSI interface One DB-19 port for connecting external floppy disk drives Stereo sound port for external audio amplifier or headphones
Video display	9-inch diagonal screen with 512-by-342-pixel bit-mapped display Color QuickDraw™ in ROM provides support for gray-scale and color video cards installed in 030 Direct Slot
Keyboard	Detachable keyboard options: Apple Keyboard and Apple Extended Keyboard
Sound	Apple Sound Chip provides four-voice wave-table synthesis and capability for stereo sampling at 44 kilohertz; drives stereo mini-phone-jack headphones or other stereo equipment



Macintosh IICX

Processor	MC68030 32-bit internal architecture; 15.667-megahertz clock speed; 256-byte instruction and data caches
Coprocessor	68882 floating-point device
Memory	1 megabyte of RAM, expandable to 8 megabytes; 256K of ROM; 255 bytes of parameter RAM
Disk storage	One built-in double-sided drive that uses 3.5-inch floppy disks with 800K capacity or 1.4-megabyte capacity; optional internal hard disk and external second floppy disk drive
Interfaces	Two RS-232/RS-422 serial ports SCSI interface; uses a 50-pin connector (internal) and a DB-25 connector (external) One DB-19 serial port for connecting external floppy disk drives Two Apple Desktop Bus ports Three NuBus internal slots supporting full 32-bit address and data buses Sound jack
Video display	Supports multiple external color and monochrome monitors connected through video cards in NuBus expansion slots
Keyboard	Detachable keyboard options: Apple Keyboard and Apple Extended Keyboard
Sound	Apple Sound Chip provides four-voice wave-table synthesis and capability for stereo sampling at 44 kilohertz; drives stereo mini-phone-jack headphones or other stereo equipment




Macintosh II

Processor	MC68020 32-bit internal architecture; 15.667-megahertz clock speed
Coprocessor	68881 floating-point device
Memory	1 megabyte of RAM, expandable to 8 megabytes; 256K of ROM standard; 255 bytes of parameter RAM; optional Paged Memory Management Unit (PMMU)
Disk storage	Two standard configurations: one built-in double-sided drive that uses 3.5-inch floppy disks with 800K capacity; or one built-in double-sided drive that uses 3.5-inch floppy disks with 800K capacity plus an internal 40-megabyte hard disk drive
Interfaces	Two RS-232/RS-422 serial ports SCSI interface; uses a 50-pin connector (internal) and a DB-25 connector (external) Two Apple Desktop Bus ports Six NuBus internal slots supporting full 32-bit address and data buses Sound port for external audio amplifier or headphones
Video display	Supports multiple external color and monochrome monitors connected through video cards in NuBus expansion slots
Keyboard	Detachable keyboard options: Apple Keyboard and Apple Extended Keyboard
Sound	Apple Sound Chip provides four-voice wave-table synthesis and capability for stereo sampling at 44 kilohertz; drives stereo mini-phone-jack headphones or other stereo equipment



Macintosh IIfx

Processor	MC68030 32-bit internal architecture; 15.667-megahertz clock speed; 256-byte instruction and data caches; on-board Paged Memory Management Unit (PMMU)
Coprocessor	68882 floating-point device
Memory	4 megabytes of RAM, expandable to 8 megabytes; 256K of ROM on a SIMM; 255 bytes of parameter RAM
Disk storage	Two standard configurations: one built-in double-sided drive that uses 3.5-inch floppy disks with 800K capacity or 1.4-megabyte capacity; or one built-in double-sided drive that uses 3.5-inch floppy disks with 800K capacity or 1.4-megabyte capacity plus an internal 80-megabyte SCSI hard disk drive
Interfaces	Two RS-232/RS-422 serial ports SCSI interface; uses a 50-pin connector (internal) and a DB-25 connector (external) Two Apple Desktop Bus ports Six NuBus internal slots supporting full 32-bit address and data buses Sound jack
Video display	Supports multiple external color and monochrome monitors connected through video cards in NuBus expansion slots
Keyboard	Detachable keyboard options: Apple Keyboard and Apple Extended Keyboard
Sound	Apple Sound Chip provides four-voice wave-table synthesis and capability for stereo sampling at 44 kilohertz; drives stereo mini-phone-jack headphones or other stereo equipment 

New Tools for Developers

Macintosh Programmer's Workshop

The Macintosh Programmer's Workshop (MPW™) is Apple's programming environment for creating high-quality Macintosh applications. MPW Version 3.0 software represents a significant upgrade in functionality over previous versions. MPW 3.0 features include:

- Projector™ software. A built-in source code management system that tracks and controls access to files so that groups of programmers or document authors can coordinate their efforts. Only one person at a time can modify a file, and previous versions can be requested according to version numbers and dates of modification.
- Symbolic Applications Debugging Environment (SADE™) software. A debugging environment that lets you monitor program execution at processor and source levels. Supports point-and-click menu access to commonly-used debugging tools and provides a full scripting language for programming conditional breakpoints, custom debugging tests, and "on the fly" code patching and testing.
- C++. ANSI-standard C improvements that provide type checking and support for object-oriented programming.
- New C compiler. Includes a feature that supports ANSI C extensions, and includes "CCvt," which converts MPW 2.02 C code to MPW 3.0 ANSI C code. Supports the C++ translator and compile options, automatically generating 68881 code for the Macintosh II. Includes an option to generate 68020-specific instructions.
- New MPW tools. Tools that now run in the background or from a file server, including an automatic installation program and improvements to many existing tools.
- New editing capabilities. Includes improved scrolling, tabs, find and search, and more. Support for the Apple Extended Keyboard and new shell variables for editing are provided.
- Assembler. Interfaces to Apple SANE® (Standard Apple Numerics Environment). A simple compile-time option allows SANE to generate code for MC68881/68882 floating-point coprocessors without requiring the programmer to rewrite the program.
- New examples. Examples written in C, Pascal, and Assembler for creating applications, desk accessories, CDEVs, and MPW Tools with color options.

MacWorkStation 3.1

MacWorkStation™ (MWS) Version 3.1 software is a development tool that enables programmers to create Macintosh "front ends" for the mainframe applications they are writing. Programmers can make existing host applications appear as local Macintosh applications, with all the "look and feel" of the Macintosh user interface.

MWS 3.1 includes utilities that enable the quick design and prototyping of MWS applications without the need for host programming. MWS Dialog Builder allows the programmer to build local dialogs from a palette of objects, and MWS Event Handler generates commands in response to MWS events.

To order Macintosh Programmer's Workshop 3.0
and MacWorkStation 3.1, call the Apple Program-
mers and Developers Association (APDA™),
Apple's new channel dedicated to development
tools and documentation, at 1-800-282-APDA.



New Apple Products: Monitors, 1-Bit Video Card, and 160-Megabyte Hard Disk

Apple Macintosh Portrait Display

The Apple Macintosh Portrait Display (M0404) is a high-resolution, 15-inch monochrome monitor for the Macintosh II family of computers. The display allows users to view a complete page in portrait orientation, including menu bars and scroll bars. The flat screen reduces the distortion normally found at the edges of many CRTs. Three Apple Desktop Bus connectors are built into the back of the monitor, allowing the keyboard and mouse to be plugged into the monitor, which is then connected to the main unit.

The Macintosh II Portrait Display Video Card displays 2 bits per pixel, delivering four shades of gray. With the optional Macintosh II Video Card Expansion Kit, the card can be upgraded to display 4 bits per pixel, delivering 16 shades of gray.

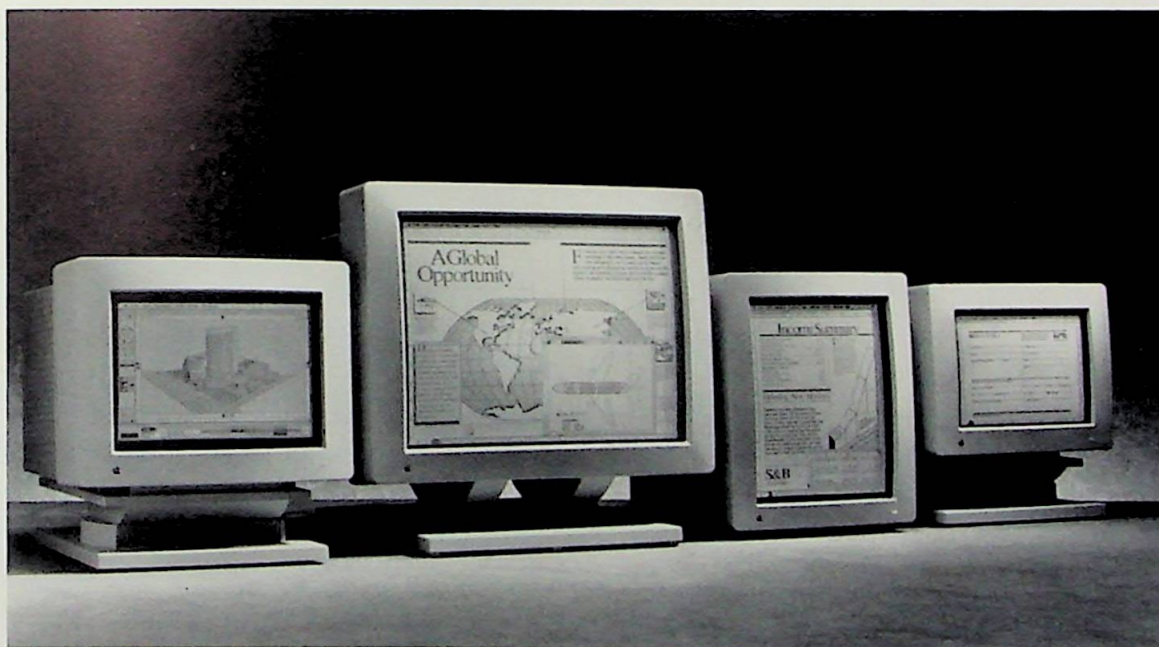
Apple Two-Page Monochrome Monitor

The Apple Two-Page Monochrome Monitor (M0402) is a high-resolution, 21-inch video display for the Macintosh II family of personal computers. The monitor allows simultaneous, side-by-side display of two full pages, including menu bars and scroll bars.

The Macintosh II Two-Page Monochrome Video Card displays 2 bits per pixel, delivering four shades of gray. With the optional Macintosh II Video Card Expansion Kit, the card can be upgraded to display 4 bits per pixel, delivering 16 shades of gray.

Compatibility

The Apple Macintosh Portrait Display and the Apple Two-Page Monochrome Monitor are compatible with the Macintosh II, Macintosh IIfx, and Macintosh IICX computers.



AppleColor RGB Monitor, the new Two-Page Monochrome Monitor, the new Apple Macintosh Portrait Display and the 12-inch Monochrome Monitor.

Technical Specifications

	Apple Macintosh Portrait Display	Apple Two-Page Monochrome Monitor
Picture tube	15-inch diagonal Phosphor EIA Type P4 (white) High-contrast antiglare surface	21-inch diagonal Phosphor EIA Type P4 (white) High-contrast antiglare surface
Refresh rate	75 hertz	75 hertz
Resolution	640 horizontal dots 870 vertical lines	1,152 horizontal dots 870 vertical lines
Dot density	80 dots per inch	77 dots per inch
Video display area	8 inches horizontal by 10.87 inches vertical Displays full letter-size or A4-size page	15 inches horizontal by 11.33 inches vertical Displays two letter-size or A-4 pages side by side
Weight	35 pounds	55 pounds
Power requirements	75 watts maximum, all line conditions	100 watts maximum, all line conditions
Input voltage		
Operating Range	90 to 270 volts AC, self-configuring	90 to 270 volts AC, self-configuring
Frequency	47 to 63 Hz	47 to 63 Hz
Stand		Integrated tilt-and-swivel stand

Monitor-Related Products

- **Macintosh II Portrait Display Video Card** (M0119)
Macintosh II video card displays four levels of gray (2 bits per pixel).
- **Macintosh II Video Card Expansion Kit** (M0213) Expansion kit displays 16 levels of gray (4 bits per pixel).
- **Macintosh II Two-Page Monochrome Video Card** (M0260)
Macintosh II video card displays four levels of gray (2 bits per pixel).
- **Apple Universal Monitor Stand** (M0403)
Matching tilt-and-swivel stand

1-Bit Video Card for Macintosh II Family

The Macintosh II 1-Bit Monochrome Video Card (M0504) provides an economical, high-quality interface for the Apple High-Resolution Monochrome Monitor (M0400). The video card's 1-bit-per-pixel display makes it perfect for anyone who does not require gray-scale or color imaging.

Compatibility

The Macintosh II Monochrome 1-Bit Video Card can be installed in Macintosh II, Macintosh IIX, and Macintosh IICX systems. The card does not work with the Macintosh Plus, Macintosh SE, or Macintosh SE/30 personal computers, the Apple Two-Page Monochrome Monitor, or the Apple Macintosh Portrait Display.

160-Megabyte Hard Disk for Macintosh II and IIX

The Macintosh IIX Internal Hard Disk 160SC (M0267) is a 5.25-inch internal drive that delivers 160 megabytes of formatted capacity with an average seek time of 18 milliseconds. The Apple Hard Disk 160SC, an external drive with the same capacity, will be available this summer.

Compatibility

The Macintosh Internal Hard Disk 160SC can be installed in Macintosh II and Macintosh IIX systems only.

Technical Specifications

Form factor	5.25-inch half-height drive
Capacity	160 megabytes
Bytes per block	512
Total disk blocks	327,780
Average seek time	18 milliseconds
Peak transfer rate	1.25 megabytes per second
Interface	SCSI



Preventing Electrostatic Discharge Problems

Test Your Knowledge about Electrostatic Discharge

1. True or false: Once a device or peripheral is installed in the computer, it is safe from electrostatic discharge (ESD) damage.
2. True or false: You can feel any discharge that is high enough to damage a part.
3. True or false: Air ionizers will solve most static discharge problems.
4. True or false: A component damaged by ESD will fail a diagnostic test.
5. True or false: You have to touch a component before there is a possibility of static discharge damaging the component.

The answer to all of these questions is "false." If you are surprised by this, read on to learn more about electrostatic discharge problems.

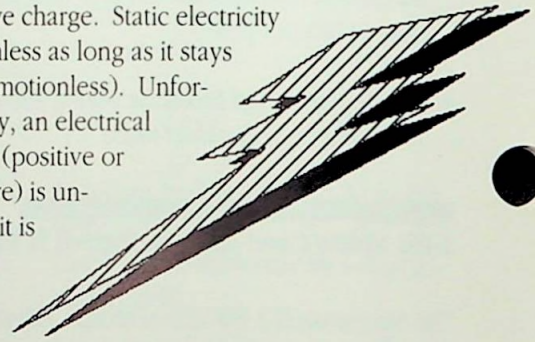
Today's high-tech components are much more susceptible to electrostatic discharge than the components of earlier years; and, as a result, the computer industry is much more aware of ESD-related problems than in the past. The simple truth is that ESD may be one of the major causes of some "intermittent" problems that are so hard to diagnose and that plague us all. ESD has become more of a hazard as microcircuits have become smaller and more sensitive. ESD is known to cause at least three kinds of component failures. *Upset failure* is a temporary foul-up that can sometimes be corrected by turning the device off and on again or by rebooting. *Soft failure* causes intermittent malfunctioning of the

equipment; this is often the most frustrating situation for the customer and a troubleshooting challenge for the repair technician. *Hard failure* makes the component and equipment nonfunctional.

What Is ESD?

Static electricity, or stationary charge, is electricity that is not moving. It is generated by the separation of two surfaces. One surface is left with a positive charge, and the other is left with a negative charge. Static electricity is harmless as long as it stays static (motionless). Unfortunately, an electrical charge (positive or negative) is unstable; it is always looking for

an opposite charge to equalize with. We see examples of static discharge in our daily lives: Remember walking along a rug and then touching someone to feel the "zap"? Most static discharges are so small you can't feel them. The smallest charge you can feel is about 3,000 volts, the smallest charge you can see is about 5,000 volts, and the smallest charge you can hear is 10,000 volts. Some of the newest semiconductor devices are susceptible to damage from as little as 10 volts—about the amount you generate by simply raising and lowering your arm 90 degrees.



Preventing ESD Problems

The only way to keep static electricity from arcing out of control is to ground all conductive materials in the area. The simple act of shifting your weight from one foot to the other can generate static, so momentary "touch" grounding is not enough; you need continuous grounding. Follow the guidelines below to avoid ESD damage.

Working in a Service Environment

- Before working on any device containing a printed circuit, ground yourself and your equipment to an earth or building ground. Use a grounded conductive workbench mat and a grounded wrist strap, and ground your equipment to the mat. Use a Ground/Polarity tester to make sure that your outlets are properly grounded.

Note: Make sure that you are *not* grounded when working on "live" equipment or when discharging a CRT.

- Do not touch anyone who is working on integrated circuits. If that person is properly grounded, your "zap" will probably not cause any damage, but play it safe.
- Use static-shielding bags for printed circuit boards and chips during storage, handling, and transportation.
- Handle all integrated circuits by the body, not by the leads.
- Do not wear polyester clothing or bring plastic, vinyl, or styrofoam objects into the work environment.

- Never place components on any metal surface.
- If possible, keep the humidity in the service area between 70 percent and 90 percent, and use an ion generator.

Working in a Home Environment

Of course, if you are working at home, you may not have the proper equipment or precise control over your environment that can be obtained in a service environment. You can, however, minimize ESD risk by following these precautions:

- Leave your computer plugged in, but turned OFF when you remove or insert cards on your logic board. If possible, let your bare forearm rest gently on the power supply as you remove or insert a card.
- Remove and insert cards in a straight up-and-down fashion, so that the entire contact surface enters and exits the slot in a single motion. Never rock a card into place.
- Do not touch the logic board or chips or the contacts on the cards. Hold all cards by the edges.
- Never insert or remove a card with the computer's power turned ON.
- Never operate your computer with its cover removed. 🍏

Making the Best Use of AppleLink

The AppleLink® network is an internal business system that connects Apple with its business partners. (AppleLink—Personal Edition, on the other hand, is available to end users and runs on Apple II computers.) The AppleLink network provides electronic mail and information services that enhance the flow of communication among members of the Apple business community.

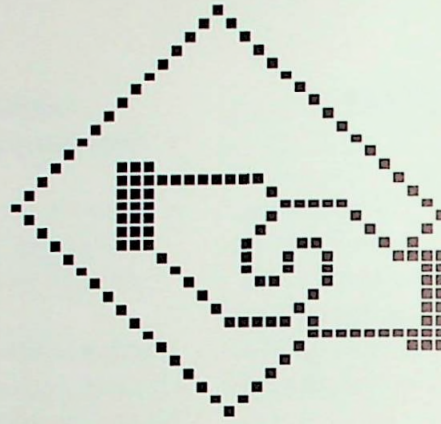
The AppleLink system includes features specifically designed to save you network time and charges. Because many users are unaware of these built-in features, we are providing an overview of them as well as offering other time- and money-saving strategies for using AppleLink.

Sending and Receiving Mail

- Use the Automatic Connection feature to let AppleLink send and receive mail before your work day begins. Set the time for Automatic Connection for early in the morning (before 5:00 A.M. if you want to cover all time zones). AppleLink will connect to the network; open, save, or print incoming mail; and send any mail in your Out Basket. Mail will be waiting for the recipients when they arrive at work.

The Automatic Connection feature is located in the Network menu. Set it up in the evening just before you leave work.

- Disconnect from the network while you browse through mail. There's no need to



spend money on network charges while you read your mail. You can use the "Shift-clicking" technique to select several messages, open them, and then disconnect. Opened mail will remain on your screen after you have disconnected.

To read selected mail while disconnected:

1. Connect to the network.
2. Open your In Basket.
3. Hold down the Shift key and click on each memo title you want to open. Selected titles will be highlighted.
4. Choose Open from the File menu.
5. When memos have been opened, disconnect from the network without quitting AppleLink.

You can take as much time as you like to browse and review, discard messages, or write responses and drop them in the Out Basket—all at no charge—and the network won't be asking if you want to stay connected.

- Use the Out Basket to save time and expense. You can write memos off-line—that is, while you are not connected to the network. Spend as much time as you like composing your memos, then address them and drop them in the Out Basket. When you connect, you can have AppleLink send them all at once and then automatically disconnect from the network, freeing you for other tasks.

To compose memos off-line:

1. Launch AppleLink and choose Work Off-line (or disconnect from the network if you are connected).

2. Choose Write a New Memo from the Mail menu, and write your memo.
3. Without connecting, choose Send Memo from the Mail menu.
4. Fill in the address box.
5. Choose Drop in Out Basket from the Mail menu.

Out Basket mail is stored on your disk until you connect and send the mail. You won't forget it's there, because an arrow in the Out Basket reminds you that mail is waiting to be sent. Mail in the Out Basket can be reopened and edited, if necessary, with the Open Out Basket command.

Choose Send Mail in Out Basket to send the mail. An additional feature lets you disconnect as soon as the mail is sent.

- Let AppleLink open your mail. When mail arrives, use the Get Unopened Mail command to receive the mail and disconnect automatically. This command lets you choose to have mail printed on paper or saved to disk, as you prefer, and then disconnects from the network.
- Let AppleLink memos do the work of disk files. It's much easier to open an AppleLink memo than to download a disk file and then open the application in order to read the memo. Turning word processing disk files into AppleLink memos can make both sending and receiving them faster and easier. Most word processing files can be sent as AppleLink memos if they are first saved as text files. Recipients can open them immediately without having to download them, and your memos are less likely to sit lost and unopened on somebody's disk. If you don't need special formatting or graphics, convert files to AppleLink memos.

You can simply write messages off-line with AppleLink, or you can convert existing word processing files so that AppleLink will treat them as memos.

To convert a message from a word processing application to an AppleLink memo:

1. Write the message.
2. Save the file as a Text Only file.
3. Open the text file using AppleLink. Once the file is on your screen, you can use the Send Memo command to mail it.

Speeding Up Network Searches for Addresses

- Use the Starts With command to find an AppleLink address. Using this command, you can find AppleLink addresses up to ten times faster than searching for all matches. Because many AppleLink addresses are made up of users' last names, you can search for them by typing the last name (or the first few letters of it) and using the Starts With option. When you choose this option, AppleLink searches only those addresses that begin with the characters you entered. When you choose All Matches, AppleLink must search every listing in its database. The former procedure can take a few seconds, while the latter can take several minutes.

To use the Starts With search option:

1. Choose Find Address from the Network menu.
2. Type in the first few letters of the last name.
3. Click Starts With and then click the Search button.

Remember that this option returns only matches on the address, and not on the description. Since some AppleLink addresses do not use a person's last name, you will sometimes want to use the All Matches option.

Knowing When Not to Use AppleLink

Sometimes the best way to use AppleLink is not to use it. Here are some suggestions:

- Use alternative services for larger files. Large files that can take up to an hour to download can be sent far more inexpensively by dropping a disk into the U.S. mail. Even smaller disk files can take up excessive network time and charges if they must be downloaded by several recipients.
- Send department wide notices once. If you want to send the same message to an entire department or workgroup, send the memo to one person and have it posted or copied and distributed. Each recipient won't have to spend network time downloading your message, and you'll avoid overloading the AppleLink network.
- Avoid the rush. Traffic on the AppleLink network is especially heavy between 8:00 and 10:00 A.M. Pacific time. The busiest day of the week is Monday. You can spend less time on the network by avoiding these peak periods. You'll be able to connect faster and read mail and find the information you need more quickly and efficiently.

Canceling Unwanted Messages and Listings

You can cancel lengthy incoming messages that you decide you do not want to read. Or, if you are looking for an article in a long list resulting from a library search, you can stop the incoming transmission and open the article of choice as soon as it is listed.

To stop an incoming transmission, hold down the Command key and type a period. If you have received a list, you can open any article that has been listed. If you are receiving text, the portion of the text that has already been received will remain on your screen.

If you have trouble using AppleLink, you can call the AppleLink HelpLine at (408) 974-3309 for assistance. The HelpLine hours are from 8:00 A.M. to 5:00 P.M. Pacific time. 🍏

Overview of DataViz Connectivity Products

If you are interested in using Macintosh files with other computers, you'll want to know more about DataViz file conversion products.

MacLink*Plus* from DataViz is a family of software connectivity products for Macintosh computers. The software provides data exchange capabilities between the Macintosh environment and MS-DOS, Wang VS, Wang OIS, and NBI systems. Here's a brief look at these products.

MacLink*Plus*

MacLink*Plus* is file transfer and translation software that allows you to exchange files between Macintosh computers and a variety of MS-DOS environments. A Macintosh disk, a PC disk, and built-in communications allow you to connect your Macintosh to a PC's serial port using the included cable or your modem. Access is provided to PC disks, directories, and files from the Macintosh using menus and dialog boxes. Compatible MS-DOS devices include a local IBM PC that is connected to the Macintosh modem or printer port using the included RS-232 serial cable; a remote IBM PC that is connected to a Macintosh via modems; remote disks or volumes made available to your Macintosh desktop by an AppleTalk-connected server or other network product; or a Macintosh MS-DOS-compatible disk drive.

The European version of MacLink*Plus* automatically adjusts special foreign characters as files are exchanged between Macintosh and MS-DOS formats. Manuals and software are available in English or French.

MacLink*Plus* includes a set of Apple File Exchange (AFE) translators, an interface cable for connecting a Macintosh to an MS-DOS computer, and interface software. The product is compatible with any Macintosh personal computer (except the Macintosh 512K).

MacLink*Plus*/Translators

MacLink*Plus*/Translators is a complete library of file translators that convert to or from file formats such as MacWrite, Microsoft Word, Microsoft Excel, Lotus 1-2-3, WordPerfect, DCA, and many more; the product includes more than 50 file translators. These translators provide an easy means of exchanging files, while retaining formats and formulas. MacLink*Plus*/Translators is available as a separate product and is also included with each member of the MacLink*Plus* family of connectivity products. You can use MacLink*Plus*/Translators with MacLink*Plus* or with your own copy of the Apple File Exchange.

Other Conversion Products

DataViz also provides these file conversion products:

- *MacLinkPlus*/Wang VS. Supplies the Macintosh user with full workstation capabilities and file transfer/translation access to the Wang VS system.
- *MacLinkPlus*/Wang OIS. Provides communications and data translation for document exchange among the Macintosh and Wang OIS, Wang PC, and IBM PC systems.
- *MacLinkPlus*/NBI. Contains data communications software, along with document translators for exchanging files between the Macintosh and NBI word processing systems.

For further information contact:

DataViz, Inc.
35 Corporate Drive
Trumbull, CT 06611
(203) 268-0030
Fax: (203) 268-4345
AppleLink: D0248



EtherTalk: How It Handles Multiple Protocols

The Macintosh II EtherTalk™ Interface Card is a low-level transport mechanism that can move a variety of protocols over an Ethernet network. *Low-level* means that the EtherTalk card addresses itself only to the lower two layers of the ISO reference model: the physical layer and the data link layer. The upper layers of the session are controlled by whatever protocol you implement over these two lower layers. Two examples of upper-layer implementations are AppleTalk and TCP/IP.

The card, using the accompanying software driver, places these upper-layer protocol packets in the data field of the Ethernet transport frame. The Ethernet frame properly addresses these packets to their "target" devices. The target device strips off the frame and then processes the packet contained inside. On the Ethernet wire, no device "cares" what the frame contains, unless the frame is directed at that device. Thus you can have devices using different upper-layer protocols, such as TCP/IP, XNS, or AppleTalk, on the same physical wire. These encapsulated packets can coexist on a single Ethernet without interference, because the devices do not look at what is inside the packet.

The software shipped with EtherTalk consists of a driver for the Macintosh II that directs AppleTalk packets to the EtherTalk card rather than to the printer port. The EtherTalk card then encapsulates the AppleTalk packet in an Ethernet frame for delivery to a device on Ethernet that understands AppleTalk packets.

Picture two Macintosh computers. One runs the AppleShare® File Server software and acts as an EtherTalk server. The second acts as an EtherTalk workstation. Both devices are connected directly to Ethernet, and use Ethernet only as a physical connection.

The EtherTalk card can also encapsulate other upper-level protocols in an Ethernet frame for transport on the network. An example of this is TCP/IP support under A/UX. Here, the Ethernet frame is the same as that used in the earlier example, but the packet contained inside the frame is TCP/IP, rather than AppleTalk. You can also use other protocols, such as XNS, with the same card, using the same Ethernet frame. The only thing that changes is the frame contents.

With Ethernet you can also have one device "push" more than one protocol over the same physical connection. An example is a VAX™ running VMS™ with AlisaTalk and DECnet™ installed. AlisaTalk delivers AppleTalk packets to the VAX, which encapsulates them in an Ethernet frame and sends them out onto the Ethernet network. The VAX can also "push" DECnet packets encapsulated in the Ethernet frame over the same card and physical connection.

The table below shows the operating system/protocol/configurations available from Apple that can be used with the EtherTalk card.

<u>Operating System</u>	<u>Upper-Layer Protocol</u>	<u>How Delivered</u>
Macintosh	TCP/IP	MacTCP™
Macintosh	AppleTalk	EtherTalk
A/UX	TCP/IP	B-NET



Connectivity: Macintosh to Xerox 6085

There are several ways for Macintosh computers to communicate with a Xerox 6085 system.

The best solutions—including AppleTalk—take advantage of the Xerox 6085 Desktop Publishing System's Ethernet communications ability. The Xerox 6085 with Ethernet installed can use Viewpoint NetCom Xerox software to provide Ethernet access. This package includes support for user authentication, and provides access to functions such as printing, filing, and electronic mail.

The communications protocol used may be either TCP/IP or XNS (both are available on Xerox systems):

- With TCP/IP, files are transferred using the Kinetics FastPath, which attaches LocalTalk™-connected Macintosh computers to Ethernet. The FastPath, in conjunction with NCSA (National Center for Supercomputer Applications) Telnet software, provides direct log-on, directory listing, and file downloading capabilities as part of its FTP (File Transfer Protocol) support. NCSA Telnet is available on Internet through subscription to Bitnet, ARPAnet, or CSNET, and directly from the University of Illinois.
- If TCP/IP is not available, XNS support can be provided through a 3Com's 3Server3. The server allows XNS transfer of files to the server, from which LocalTalk-connected Macintosh systems download or upload files for the Xerox 6085.

Another solution is Kid from Interpreter, Inc. in Wheat Ridge, Colorado. Kid includes a conversion utility that writes Xerox 6085 files to 5.25-inch MS-DOS disks. The files can be written to and read from PC software packages, such as Microsoft Word, WordStar, and MultiMate. These PC disks are placed in an Apple 5.25-inch MS-DOS-compatible drive, and files are copied to or from the Macintosh computer using the Apple File Exchange software.

Finally, the Xerox 6085 system can communicate through its serial port. One option is to send serial information from the Xerox 6085 through this port to the Macintosh, and vice versa. This method represents a low-end connectivity solution.

For further information, contact the National Center for Supercomputer Applications at (217) 244-0072 or 244-2347, or contact Xerox Technical Support at (214) 240-0544. 🍏

LaserWriter Printing on a UNIX Network

There are several ways in which Apple LaserWriter® printers can be accessed by Macintosh computers running A/UX or machines with UNIX® operating systems, such as the Sun workstation. Here are a few solutions:

- If all the UNIX machines are on an Ethernet network, and if the LaserWriter is connected via serial port to one of the UNIX machines, all UNIX machines on the network can access the LaserWriter, using existing UNIX printer software or remote command execution.

For example:

```
cat localfile | rsh remote_aux lp
```

Output to remote A/UX default printer from non-A/UX machine.

```
cat localfile | remsh remote_VAX "lpr -Plw2"
```

Output to remote VAX-based LaserWriter II from A/UX machine.

```
lpr -Plw2 localfile
```

Output to the local LaserWriter II. Or LaserWriter II might be remotely connected on another UNIX machine, particularly if both UNIX machines run with Berkeley line printer spooler software (/usr/lib/lpd, /etc/printcap, and so on).

Note: The A/UX Version 1.0 software does not support Berkeley remote printing.

- Use one of the following to access a LocalTalk-connected LaserWriter from a UNIX machine via Ethernet:

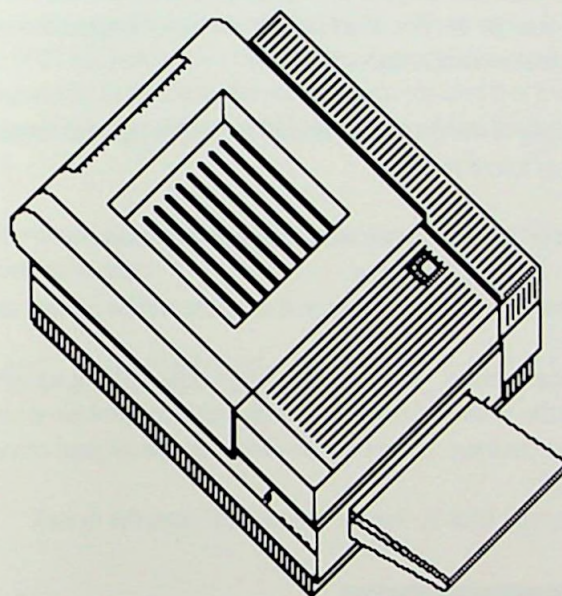
Columbia AppleTalk Package (CAP) from Columbia University*
Kinetics Internet Protocol (KIP) from Stanford University*
FastPath from Kinetics

- Use the SuperMac CommCard if you want to use A/UX to print to a LaserWriter printer over an AppleTalk network. The CommCard manages all aspects of AppleTalk under A/UX.

A/UX Version 1.1 software supports AppleTalk (LocalTalk) printing products. A/UX implements a subset of AppleTalk protocols and provides A/UX-style command, library, and I/O interface. (Either the AST Research Intelligent Communications Processor or the SuperMac CommCard is required.)

* Available in the public domain.

Kinetics FastPath is available from:
Kinetics, Inc.
2500 Camino Diablo, Suite 110
Walnut Creek, CA 94596
(415) 947-0998
AppleLink: D0929



Database Integrity in FileMaker II

FileMaker II from Claris maintains indexes about its databases; unfortunately, these delicate indexes are easily corrupted. System errors, power outages, and events that result in the message "FileMaker has unexpectedly quit" can all cause corruption. This article describes how to spot possible problems and correct them.

Identifying and Correcting Corrupted Files

The first sign of danger is when FileMaker displays a dialog box about making minor repairs. Externally, it appears that all is well. The number of records in the database does not change, and all data seems to be present. When you use the Find command, however, corrupted indexes yield erroneous data. Any reports you generate can contain errors as well.

To restore the integrity of the database, perform the following steps immediately after being notified that FileMaker is making "minor repairs":

1. Close the database, but do not quit the FileMaker application.
2. Choose Recover from the File menu.
3. Select the database in question. A restored database will be created and named "Recovered database—[name]."
4. Save a copy of the "corrupt" database on a floppy disk. (This is a precautionary measure only.)
5. Make a copy of the recovered database. Verify the recovered file is accurate; check for any known problems. If the database is correct, you can delete the original corrupted file, as well as the copy you made in step 4.
6. Rename the database (that is, remove "Recovered" from the name).

Increasing Performance for Large Databases

Over time, even without corrupted indexes, a FileMaker database can grow excessively larger and thus perform more slowly. Here's a way to make a large, often-used database leaner:

1. Save a copy of the database.
2. Close the original.
3. Open the copy.
4. Import the data from the original into the copy.

The resulting database should take up less disk space and perform faster than its predecessor.

You can also speed performance by using a utility program, such as Symantec Utilities for Macintosh or DiskExpress, to optimize hard disk layout. Be sure to back up your database file before using these utilities. 🍏

Identifying the Current Volume in HyperCard

If pathnames to files in a HyperCard® stack have been hard-coded in a script, users will experience difficulty using the stack on their own hard disks, which have different names from the pathnames in the script. The following example shows how this problem can arise.

One of our customers recently developed a stack to replace an orientation handbook given to new employees. The handbook contained information about policies and procedures—all text—and organization charts and company forms—all graphics. To combine everything in one stack, the textual information was placed into fields and David Fry's public domain XCMD *DispPICT* was used to display PICT files in a window over the HyperCard window.



HyperCard

The stack resided in a folder. Also within the folder was another folder containing all of the PICT files. The pathname to each PICT file was hard-coded into the appropriate scripts. Everything worked well until the customer was ready to distribute the software and realized that everyone's hard disk had a different name; once they were copied to the hard disks, the files could no longer be accessed by the hard-coded pathnames.

The following function returns the volume name which can then be concatenated with the rest of the pathname, replacing the hard-coded pathname.

```
function volName
  return char 2 to (offset (":", word 2 of the long name of this
    stack)-1) of word 2 of the long name of this stack
end volName
```



Macintosh: How to Find the ROM Version Number

Here's how to determine the version number of the ROM in your Macintosh computer. You must have the programmer's switch installed to use this procedure.

1. Press the interrupt switch. (The interrupt switch is the switch on the rear of the programmer's switch on all Macintosh computers except on the Macintosh IICX, where the interrupt switch is next to the programmer's switch.)
2. If you have a Macintosh 128K, 512K, Plus, or SE system, type:

DM 400008

If you have a Macintosh SE/30, IICX, II, or IIX, type:

DM 800008

The first byte displayed indicates the type of Macintosh:

00 = Macintosh 128K, Macintosh 512K, or Macintosh Plus

01 = Macintosh SE/30, Macintosh IICX, Macintosh II, or Macintosh IIX

02 = Macintosh SE

The second byte displayed indicates the ROM version. Currently, these are:

75 for a Macintosh Plus

76 for a Macintosh SE

78 for a Macintosh SE/30, Macintosh IICX, Macintosh II, or Macintosh IIX computer



Macintosh II: Automatic Power-on

You can cause the Macintosh II to start up automatically after a power failure by building a custom Apple Desktop Bus (ADB) device or a custom NuBus card, as follows:

- The ADB device will need to ground pin 2 momentarily.
- On the NuBus card, drive the /PFW (Power Fail Warning) line high.



ImageWriter II: Bi-directional Printing

At the expense of some print quality, you can invoke bi-directional printing on the ImageWriter® II when printing in the "Faster" mode. To invoke bi-directional printing, hold down the Caps Lock, Option, and Shift keys while you click the OK button in the Print dialog box.

Bi-directional printing will remain in effect until the printer is reset. You can also turn it off the next time you print: Hold down the Command key while clicking the OK button in the Print dialog box.

This function applies only to the ImageWriter II, and print quality may be affected. The procedure works particularly well for printing drafts that you want to review as quickly as possible, when you are simply interested in reviewing content, and when the print quality is not critical. 🍏

Current Macintosh Software Versions

Application	Current Version	Date Released
A/UX (System)	1.1	1/89
AppleFax™ Installation Disk	1.2	1/27/89
AppleLink	4.0	6/86
Apple Hard Disk SC Setup Disk	2.0	
AppleLine™ 3270 File Transfer	1.0	4/87
AppleScan™	1.0.2	1/89
AppleShare (File Server)	2.0.1	7/11/88
AppleShare (Workstation)	1.0	1/87
HyperCard	1.2.2	11/8/88
HyperScan™	1.0.1	1/5/89
Inter•Poll™	1.0.1	2/89
LaserWriter Installer	2.1	6/3/87
LaserWriter II Installation	2.0	6/7/88
Macintosh 68000 Development System	2.0	11/16/86
Macintosh Pascal & Utilities	2.1	7/8/86
Macintosh Plus System Tools	1.1	6/4/86
Macintosh 512K Enhanced System Tools	1.0	6/4/86
Macintosh SE System Tools		3/87
Macintosh SE Utilities		3/87
MacTerminal® (800K)	2.3	7/22/88
Printing Tools	6.0.2	9/8/88
System Tools	6.0.3	2/89
	6.0.2	9/14/88
Utilities 1	6.0.3	2/89
	6.0.2	9/14/89
Utilities 2	6.0.3	2/89
	6.0.2	9/8/88

Note: System Software Version 6.0.3 is a product support release, rather than a major system release. Only owners of Macintosh SE/30 computers and users of the Apple File Exchange (on any Macintosh computer) need to upgrade to Version 6.0.3.



New Software Updates

Inter•Poll Version 1.0.1

Inter•Poll 1.0.1 software supports two additional CPUs: the Macintosh IIx and the Macintosh SE/30. Inter•Poll users who have added, or anticipate adding, either of these machines to their networks should take advantage of this update. All owners of Inter•Poll are eligible to receive Version 1.0.1 free of charge.

AppleScan Version 1.0.2

In addition to fixing a number of minor bugs, AppleScan 1.0.2 offers more control over Preview, improved compatibility with the AppleFax Modem, and improved transfer of PICT files. Version 1.0.2 of the AppleScan software is available free of charge.

AppleFax Firmware Version 1.2

AppleFax Firmware 1.2 fixes specific incompatibility problems with some Group 3 facsimile machines and certain phone systems, particularly Private Branch Exchange (PBX) phone systems. Version 1.2 of the AppleFax firmware is available free of charge.

AppleFax Software Version 1.2

Version 1.2 of the AppleFax Modem application and the AppleFax Modem Resource contains a number of improvements over Version 1.1, including compatibility with System Software 6.0.3, an end to "character collisions," and improved performance of the "in care of" feature. Version 1.2 of the AppleFax software is available free of charge. 🍏

Current Apple Upgrades and Updates

An **upgrade** enhances features of existing hardware or software. Generally an upgrade involves a fee, and any additional Apple hardware must be installed by an authorized Apple service provider.

A software **update** consists of enhancements, fixes, or patches to software. An update to Apple software is handled through an authorized Apple dealer or your Apple sales representative.

Following is a summary of the upgrades and updates currently available for Macintosh computers and LaserWriter products.

Macintosh 128K, 512K Upgrade to Macintosh Plus

Owners of Macintosh 128K and Macintosh 512K computers can upgrade to the Macintosh Plus. The upgrade consists of the Macintosh Plus Disk Drive Kit (part number M2516) and the Macintosh Plus Logic Board Kit (part number M2518/A).

Macintosh II Upgrades

The ROM upgrade for the Macintosh II enables the Macintosh II to recognize more than 1 megabyte of address space on a NuBus card.

Macintosh II users who want to achieve full system equivalence with the Macintosh IIX system can do so by replacing the Macintosh II logic board with the Macintosh IIX logic board Upgrade (part number M0271) and the Macintosh II FDHD Upgrade Kit (part number M6051).

LaserWriter IISC Upgrades

To upgrade the LaserWriter IISC printer to the LaserWriter IINT, purchase the LaserWriter IINT Controller Card (part number M6009). To upgrade the LaserWriter IISC to the LaserWriter IINTX, use the LaserWriter IINTX Controller Card (part number M6004).

LaserWriter to LaserWriter Plus (LaserWriter Kit)

To upgrade the LaserWriter printer to a LaserWriter Plus, an authorized Apple service provider installs 1 megabyte of ROM. The customer then installs new screen fonts using the printer installation disk (supplied).

LaserWriter PostScript Upgrade Program (LaserWriter Plus Kit)

To upgrade LaserWriter Plus ROMs to PostScript® version 47, an authorized Apple service provider installs the LaserWriter Plus Kit.

LocalTalk PC Card ROM Upgrade

Apple has revised the ROM on the LocalTalk PC Card to upgrade the ROM checksum. This upgrade improves compatibility with various software packages, and is available free of charge.

MacTerminal 2.3

This update is available free of charge. The new version features full MultiFinder™ software compatibility and an improved user interface.

MacPascal 2.1

This update is available free of charge. MacPascal has been discontinued, and 2.1 is the last version that will be offered.

Claris Software

For information about upgrades and updates to Claris MacWrite, MacPaint, MacDraw, and MacProject programs, please contact:

Claris Corporation
440 Clyde Avenue
Mountain View, CA 94043
1-800-544-8554 🍏

Corrections to Macintosh Technical Bulletin, Issue 3, March–April 1989

On page 2, the part number listed for the Macintosh SE/30 with 1 megabyte of RAM and a 1.4-megabyte FDHD drive is incorrect. The correct part number is M5392.

On page 29, the following lines in the HyperCard script

```
-Originated by Marv Westrom - Vancouver, B.C.
```

```
-revised by Grover F. Nunnery - Apple Computer, Inc.
```

should be preceded by a double hyphen (--) rather than a dash. The double hyphen indicates that these lines are comments.

On page 30, Step 6 of the A/UX tape backup procedure is incorrect. The correct procedure for step 6 is to repeat the command that is given in step 2. Also on page 30, the final command is incorrect. The incorrect line reads:

```
diff /tmp/allfiles /tmo/allfiles.new > tmp/differences
```

The correct command is:

```
diff /tmp/allfiles /tmp/allfiles.new > /tmp/differences
```

Notice that "tmo" has been changed to "tmp" and a slash has been added. 🍏

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The *Macintosh Technical Bulletin* provides users with current technical information about Apple products. Featured topics may be under consideration, and new product versions may be under development. Therefore, it's appropriate to consider this publication as a bulletin that is correct at the date of publication, rather than as a long-term reference source.

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